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Docket No.: 10015867-1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s):	Bradford A. Ritter	Confirmation No.:	7032
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ATTENTION: BOARD OF PATENT APPEALS AND INTERFERENCES

APPELLANT'S RESPONSE TO EXAMINER'S ANSWER (37 CFR 1.193(b))

This Reply is in response to the Examiner's Answer mailed November 2, 2004.

Summary of Reply Arguments Presented Below

(A) Issues;

(B) Rejections under 35 U.S.C. § 102(a) over *Wei*;

(C) Rejections under 35 U.S.C. § 103(a); and

(D) Conclusion.

Reply Arguments

A. Issues

The Examiner maintains in the Answer that claims 1-10, 14, 17-20, 23, 25, and 27-31 are anticipated under 35 U.S.C. § 102(a) by SIGGRAPH 2000 Conference Proceedings pg. 479-488 by Wei et al. (hereinafter "*Wei*"). The Examiner further maintains that claims 11-12 and 21-22 are unpatentable under 35 U.S.C. § 103(a) over *Wei*. Additionally, the Examiner maintains that claim 13 is unpatentable under 35 U.S.C. § 103(a) over *Wei* in view of U.S. Patent No. 6,232,981 to Gossett (hereinafter "*Gossett*"), and the Examiner maintains that claims 15, 16, 24, and 26 are unpatentable under 35 U.S.C. § 103(a) over *Wei* in view of U.S. Patent No. 4,601,055 to Kent (hereinafter "*Kent*"). Accordingly, issues A-D identified in Appellant's Appeal Brief remain before the Board for consideration.

In reply, Appellant hereby reiterates the arguments presented in Appellant's Appeal Brief by reference thereto, and submits the further arguments below to address the specific points raised in the Examiner's Answer.

B. Rejections under 35 U.S.C. § 102(a) over *Wei*

Claims 1-10, 14, 17-20, 23, 25, and 27-31 stand rejected under 35 U.S.C. § 102(a) as being anticipated by *Wei*. To anticipate a claim under 35 U.S.C. § 102, a single reference must teach every element of the claim, *see* M.P.E.P. § 2131. Appellant respectfully submits that *Wei* fails to teach each and every element of claims 1-10, 14, 17-20, 23, 25, and 27-31, as discussed further below.

<u>1. Independent Claims</u>

Wei fails to teach every element of independent claims 1, 17, and 27. For instance, independent claim 1 recites:

> generating a matrix of said desired size;
> providing values to said matrix, wherein said values comprise <u>random values</u> and <u>wherein at least a portion of said values represents a desired structure according to which graphical features of a synthesized texture are to substantially conform</u>; and
> executing a texture synthesis process that utilizes said matrix to generate a synthesized texture of said desired size <u>having graphical features</u>

arranged therein substantially in conformance with said desired structure. (Emphasis added).

Independent claim 17 recites:

a first data structure defining said sample texture of a first plurality of values;

a second data structure defining a texture of a second plurality of values, wherein at least a portion of said values of said second data structure are random and wherein at least a portion of said values of said second data structure represent a desired structure according to which graphical features are to substantially conform; and

a texture synthesis algorithm, said texture synthesis algorithm being operable to utilize at least said first data structure and said second data structure to generate a synthesized texture having graphical features arranged therein in substantial conformance to said desired structure. (Emphasis added).

Independent claim 27 recites:

code for generating a matrix of said desired size;

code for initializing said matrix with a plurality of values, wherein at least a portion of said values are random and wherein at least a portion of said values represent a desired structure according to which graphical features are to be arranged; and

code for generating a synthesized texture of said desired size having graphical features arranged therein according to said desired structure. (Emphasis added).

As discussed in the specification of the present application (*see e.g.*, paragraphs 0027-0033), Appellant respectfully submits that *Wei* does not teach at least the above-emphasized elements of independent claims 1, 17, and 27.

The texture synthesis process is described in detail in Appellant's Appeal Brief, and is therefore not repeated in such detail here. However, as discussed in Appellant's Appeal Brief, *Wei* fails to teach a matrix that is used in its texture synthesis process which includes both random values and values that represent a desired structure.

First, *Wei* describes a texture synthesis algorithm for single resolution (section 2.1 of *Wei*). *Wei* describes an initial matrix (*Is*) that is used in its synthesis process, which includes random white noise. However, this initial matrix (*Is*) does not include values that represent a desired structure. Further, a texture sample (*Ia*) is provided, which does not include any random values. The *Ia* and *Is* matrices are input to the texture synthesis algorithm, and *Is* is forced to look like *Ia* by transforming *Is* pixel-by-pixel in a raster scan ordering. The

resulting matrix has synthesized, low-resolution image values. At this stage, such matrix does not include random values, but instead has the synthesized low-resolution image values. Again, no matrix is provided in this single resolution algorithm of *Wei* that includes both random values and values that represent a desired structure.

Wei further describes how to extend its single resolution algorithm using a multiresolution pyramid (*Gs*) to obtain improvements in computational efficiency (section 2.3 of *Wei*). In this case, a pyramid (*Gs*) has a plurality of levels (matrices), in which each higher resolution level is constructed from an already synthesized lower resolution level. The initial level (matrix) of the *Gs* pyramid is built from *Is*, which is random white noise. Accordingly, the initial level (matrix) of the *Gs* pyramid does not include any values therein that represent a desired structure according to which graphical features of the synthesized texture are to substantially conform, but is instead random white noise.

During operation of the multiresolution synthesis algorithm, *Ga* (a Gaussian pyramid built from *Ia*) and *Gs* are used in the synthesis algorithm in a manner similar to the use of *Ia* and *Is* in the above-described single resolution technique. Indeed, *Wei* states that the only modification to the single resolution algorithm for the multiresolution case is that each neighborhood *N(p)* contains pixels in the current resolution as well as those in the lower resolutions. *See* section 2.3 of *Wei*. *Wei* explains that these "lower resolution pixels constrain the synthesis process so that the added high frequency details will be consistent with the already synthesized low frequency structures." Section 2.3 of *Wei*. Again, the purpose of *Wei's* multiresolution technique is to permit higher resolution textures to be synthesized with use of moderately small neighborhoods.

Accordingly, during operation of the multiresolution synthesis algorithm, a first level matrix of low resolution is generated in the *Gs* pyramid using the neighborhood approach. For example, a first level matrix of low resolution that may be generated is shown in Figure 7(a) of *Wei*. This first level (low resolution texture) is then used, rather than the white random noise matrix (initial level of the *Gs* pyramid), to generate a second level of higher resolution, such as the higher-resolution second level matrix of Figure 7(b) of *Wei*. In turn, this second level matrix may be used to generate an even higher-resolution third matrix, such as the third level matrix of Figure 7(c) of *Wei*.

Of course, the matrices used in the above-described stages of operation of *Wei's* synthesis algorithm do not contain random values. Rather, such matrices (e.g., of Figures 7(a)-(c) of *Wei*) each includes a synthesized texture at progressively higher resolutions. For instance, the first level low-resolution matrix (e.g., matrix of Figure 7(a)) includes synthesized image values at low-resolution, and does not include any random values. That is, the low-resolution first level (matrix) of the *Gs* pyramid has all of its values synthesized (computed) according to the texture synthesis algorithm of *Wei*. As such, these values are not random, but are instead computed values. If merely random values were acceptable for such matrix, the texture synthesis algorithm of *Wei* would be unnecessary.

Further, as described above, the low-resolution first level matrix is processed to generate a higher-resolution second level matrix of the *Gs* pyramid. Accordingly, such second level (matrix) of the *Gs* pyramid has all of its values synthesized (computed) according to the texture synthesis algorithm of *Wei*. As such, these values are not random, but are instead computed values. It is exactly this feature that enables the pyramid approach of *Wei* to progressively improve resolution at each level of the pyramid. It is unclear how (if at all) the resolution could be progressively improved in *Wei* if the matrices at each level of the pyramid included random values. Indeed, it would seem that including random values in the synthesized levels of the pyramid would work against the goal of improving resolution in the subsequent levels.

In view of the above, the initial level of the *Gs* pyramid provides a matrix that has only random values (the initial level is built from *Is*), and the subsequent levels of the *Gs* pyramid provide matrices having synthesized values at progressively improved resolution (and thus include no random values). Accordingly, no matrix in the *Gs* pyramid of *Wei* includes <u>both</u> random values and values that represent a desired structure.

<u>Reply to Examiner's Answer to the Above Arguments</u>

As discussed above, independent claims 1, 17, and 27 each recite two types of values that are included in a matrix: 1) random values, and 2) values that represent a desired structure according to which graphical features of a synthesized texture are to substantially conform. As also discussed above, any given matrix in *Wei* has only one type of values, either random or non-random.

The Examiner asserted in the Advisory Action mailed June 14, 2004 that "Wei discloses 'We force the random noise Is to look like Ia' (page 481, 2.1, line 2)." Page 2 of Advisory Action. The Examiner concludes "[t]herefore, Is becomes pseudo-random but has similar structure of Ia." Page 2 of Advisory Action. In the Answer, the Examiner further asserts that the "examiner considers since *Ia* is a texture sample *Is* has the desired structure and since *Is* is forced to look like *Ia*, it has both desired structure and randomness." Page 15 of Examiner's Answer.

Applicant disagrees. As explained above, initially *Is* is completely white random noise. After *Is* and *Ia* are processed according to the texture synthesis algorithm of *Wei*, *Is* contains computed values to force it to look like *Ia*, and thus at this point *Is* does not contain random values. At no point does *Is* (or any other matrix of *Wei*) contain both types of values recited in the independent claims of the present application.

As mentioned above, in the Advisory Action, the Examiner asserted that *Is* becomes "pseudo-random" as a result of the processing by the texture synthesis algorithm. Thus, it appears that the Examiner alleges that because the texture synthesis algorithm of *Wei* uses the white random noise values initially provided in *Is* and the texture sample *Ia*, the resulting values of *Is* computed by the texture synthesis algorithm are somehow both random and represent a desired structure. Applicant maintains that while the computed values are derived based in part on white random noise in *Wei*, those resulting values are not random. Indeed, if random values were desired in the resulting *Is* matrix, the texture synthesis algorithm of *Wei* would be unnecessary because the *Is* matrix initially contains white random noise. The entire purpose of the *Wei* texture synthesis algorithm is to compute a synthesized texture based on the sample texture *Ia*, not to compute mere random values. Accordingly, it is unreasonable to assert that any of the values produced by the *Wei* texture synthesis algorithm are in some way random. Even though those values are derived based in part on the random white noise initially present in *Is*, the resulting output values of the texture synthesis algorithm are not random but instead are a desired synthesized texture. Again, if an output of random values was desired, use of the texture synthesis algorithm of *Wei* would be unnecessary.

Accordingly, no portion of the values initially provided in the *Is* matrix (prior to processing by the texture synthesis algorithm) represent a desired structure, but are rather all white random noise. And, no portion of the values in the *Is* matrix resulting from the

processing of the texture synthesis algorithm are random, but instead all of such values are specifically computed values of a desired texture image (as computed by the texture synthesis algorithm).

Further, irrespective of what the values computed from the texture synthesis algorithm are considered (e.g., whether random, non-random, or "pseudo-random," as asserted by the Examiner in the Advisory Action, or even constant values, as asserted by the Examiner in the answer with regard to claims 2 and 3 as discussed below), all of the values in the synthesized matrix are of the same type. That is, all of the resulting values are values that are computed as a result of the texture synthesis algorithm based on the *Is* and *Ia* matrices. Thus, a portion of the values in the resulting synthesized matrix are not of a different type than all other portions thereof. Thus, the resulting synthesized matrix does not include both a portion of values that are random values and a portion of values that represent a desired structure according to which graphical features of a synthesized texture are to substantially conform, as recited by independent claims 1, 17, and 27.

2. Dependent Claims

In view of the above, *Wei* fails to teach each and every element of independent claims 1, 17, and 27. As such, independent claims 1, 17, and 27 are not anticipated under 35 U.S.C. § 102(a) by *Wei*. Further, dependent claims 2-10, 14, 18-20, 23, 25, and 28-31 stand rejected under 35 U.S.C. § 102(a) as being anticipated by *Wei*. Each of dependent claims 2-10, 14, 18-20, 23, 25, and 28-31 depend either directly or indirectly from one of independent claims 1, 17, and 27, and thus inherit all limitations of the respective independent claim from which they depend. It is respectfully submitted that dependent claims 2-10, 14, 18-20, 23, 25, and 28-31 are allowable not only because of their dependency from their respective independent claims for the reasons discussed above, but also in view of their novel claim features (which both narrow the scope of the particular claims and compel a broader interpretation of the respective base claim from which they depend). As such, Appellant respectfully requests that the rejections of claims 1-10, 14, 17-20, 23, 25, and 27-31 as being anticipated under 35 U.S.C. § 102(a) by *Wei* be overturned.

Further, dependent claim 2 recites "providing constant values to said matrix that represent said desired structure." Dependent claim 3 recites "providing constant values to

said matrix that are arranged therein to represent said desired structure." Dependent claim 19 recites "constant values arranged in said second data structure to represent said desired structure." And, dependent claim 28 recites "code for providing constant values to said matrix arranged therein to identify said desired structure." *Wei* fails to teach at least these elements of claims 2, 3, 19, and 28. For instance, at no point does the *Is* matrix of *Wei* include both random values and constant values that represent a desired structure. Thus, dependent claims 2, 3, 19, and 28 are not anticipated by *Wei* for these further reasons.

Reply to Examiner's Answer to the Above Arguments

In maintaining the rejection of claim 2 in the Answer, the Examiner asserts that *Wei* discloses "providing constant values to said matrix that represent said desired structure (Gs ← BuildPyramid(*Is*) where *Is* are a plurality of constants, since *Is* contain both random values and texture values after being forced to look like *Ia*)." Page 4 of the Answer. Similarly, in maintaining the rejection of claim 3 in the Answer, the Examiner asserts that *Wei* discloses "providing constant values to said matrix that are arranged therein to represent said desired structure (Gs ← BuildPyramid(*Is*) where *Is* are a plurality of constants, since *Is* contain both random values and texture values after being forced to look like *Ia*)." Page 4 of the Answer.

Thus, while the Examiner first alleges with regard to claim 1 that the values produced in *Is* by the texture synthesis algorithm of *Wei* are pseudo-random values, the Examiner now alleges with regard to claims 2 and 3 that those values produced in *Is* by the texture synthesis algorithm of *Wei* are constant values. Thus, the Examiner appears to change his position with regard to what the values produced in *Is* by the texture synthesis algorithm are considered (e.g., whether random, pseudo random, or constant) from claim to claim. Accordingly, the Examiner's position is inconsistent.

Again, claim 1, from which claims 2 and 3 each depends, recites that the matrix includes random values in addition to the constant values recited in claims 2 and 3. Irrespective of what the values computed from the texture synthesis algorithm in *Wei* are considered (e.g., whether random, non-random, "pseudo-random," or constant values), all of the values in the synthesized matrix are of the same type. That is, all of the resulting values are values that are computed as a result of the texture synthesis algorithm based on the *Is* and

Ia matrices. Thus, a portion of the values in the resulting synthesized matrix are not of a different type than all other portions thereof. Accordingly, the resulting synthesized matrix does not include both a portion of values that are random values and a portion of values that are constant values, as recited by claims 2 and 3.

Additionally, dependent claim 23 recites "wherein said texture synthesis algorithm is operable to transform said second data structure into said synthesized texture." *Wei* fails to teach this further element of claim 23. For instance, as described above, *Wei* processes matrix *Is* that is initially formed of white noise to generate a synthesized texture. However, *Wei* does not transform a data structure that comprises both random values and values that represent a desired structure into a synthesized texture. Rather, the values of the *Is* matrix that is transformed in *Wei* consists solely of random white noise. Thus, dependent claim 23 is not anticipated by *Wei* for this further reason.

C. Rejections under 35 U.S.C. § 103(a)

Claims 11-12 and 21-22 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei*. Additionally, claim 13 is rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei* in view of *Gossett*. Further, claims 15, 16, 24, and 26 are rejected under 35 U.S.C. § 103(a) as being unpatentable over *Wei* in view of *Kent*.

With regard to dependent claim 11, it recites "wherein said sample texture comprises a parametric texture map (PTM) texture." Similarly, dependent claim 21 recites "wherein said sample texture comprises a parametric texture map (PTM) texture." The Examiner acknowledges that this is not taught by *Wei*. However, the Answer asserts that the Examiner "considers it is within the ability of one of ordinary skill in the art at the time the invention was made to extend the method to parametric texture map in order to synthesize a well known sub-class of texture map because the variable describing the incident light direction is just one extra variable, like any other variables, in describing a texture map." Page 16 of the Answer.

However, merely because it is within the ability of one of ordinary skill in the art to modify a reference in this manner does not mean that it is obvious to do so. It is well settled that the fact that references can be modified is not sufficient to establish a prima facie case of

obviousness, *see* M.P.E.P. § 2143.01. The mere fact that references can be combined or modified does not render the resultant combination or modification obvious unless the prior art also suggests the desirability of the combination or modification. *In re Mills*, 916 F.2d 680, 16 U.S.P.Q.2d 1430 (Fed. Cir. 1990), as cited in M.P.E.P. § 2143.01.

As discussed in Appellant's Appeal Brief, no motivation exists for utilizing a PTM texture in the *Wei* synthesis algorithm as the *Wei* algorithm, as taught, is not capable of receiving such a PTM texture as an input texture. Accordingly, use of a parametric texture map (PTM) texture as recited by claims 11 and 21 is not obvious under 35 U.S.C. § 103(a) over *Wei*.

D. Conclusion

As for any of the claims not specifically discussed above, Appellant hereby reasserts the arguments presented in Appellant's appeal brief.

For the reasons advanced in Appellant's Appeal Brief and in this Reply, Appellant respectfully submits that claims 1-31 are of patentable merit. Therefore, reversal of the outstanding rejections is courteously solicited.

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